

TORREYA

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THE VEGETATION OF NORTHWESTERN OREGON

BY J. E. KIRKWOOD

A glance at the map of Oregon will show that the northwestern part of the state is mostly mountainous. In fact, that area which lies south and west of the lower course of the Columbia River, comprising mainly Columbia, Clatsop and Tillamook counties, is a mountainous region traversed by the narrow valleys of such small streams as the Nehalem and Nestucca rivers. From the Columbia River extending southward the Coast Mountains leave little space between their bases and the ocean, most of the tillable land of this section being found on the lower foothills and in the broadened outlets of the canyons of streams which head among the mountains and empty directly into the sea. East of the Coast Mountains lies the Willamette valley which contains most of the farming land of the state west of the Cascades. The flora of this region presents some interesting features.

As it has been about fifty years since the first considerable immigration into western Oregon, most of the original forest-covering has been removed from the lowlands. In those parts of the valley where this has occurred, a remnant of the forest remains along the banks of streams whose location and course may by this means be determined from a distance. Some of the trees which occupy such situations are easily recognized for miles by an experienced eye. Especially is this true of *Abies grandis* with its cylindrical outline and bluntly conical top. At shorter range one may easily recognize *Thuja gigantea* and *Pseudotsuga mucro-*

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nata. But such places are the special habitat of *Abies* and *Thuja* of the species above mentioned and *Taxus brevifolia* representing the gymnosperms, which are associated with a lower growth of deciduous trees and shrubs, among which are very readily found *Fraxinus Oregana*, *Acer circinatum*, *A. macrophyllum*, *Cornus Nuttalli*, *Prunus emarginata*, *Alnus Oregana*, *Philadelphus Californicus*, *Spiraea Douglasii*, *Holodiscus discolor* and *Viburnum ellipticum*.

These form in most places dense thickets of undergrowth overhanging the muddy banks of the streams. So far as was observed, the vegetation above described was very uniform. As we ascend the streams from the alluvial lowlands toward the hills, however, a considerable difference may be observed.

The uplands, as the term is here used, have an altitude of from 200 to 500 feet above sea-level and include practically all the soil not restricted to creek or river bottoms within this altitude. They may not be much higher than the bottom lands but the soil contains more sand, is coarser and drains dry more readily. This brown loam, at the most but a few feet in depth, is underlaid by a clayey subsoil. The uplands are undulating with here and there comparatively small areas, swales, with a peculiar clayey soil supplied with springs and possessing some peculiarities of vegetation.

The forest covering of the uplands consists mainly of *Pseudotsuga*. As a rule no other gymnosperms are present. In many places this tree has such a monopoly of soil and light as to exclude almost everything else. In the more open woods, however, we find *Cornus*, *Acer*, *Corylus*, *Spiraea*, and sometimes *Quercus Garryana*. *Quercus* usually forms groves by itself and does not grow so well in the open forest of *Pseudotsuga* as do some other deciduous trees. There is not a large number of deciduous trees and shrubs and most of the lower growth of the upland forests consists of but few species of the genera above named. A smaller shrubby growth consisting of species of *Gaultheria* and *Berberis* constitutes nearly all of the immediate soil-covering over large tracts of forest land.

The swale areas, as has already been said, possess some peculiarities worth noticing. While the Douglas spruce is still the

most prominent feature of the vegetation, yet it is not so abundant as elsewhere and leaves space for a luxuriant undergrowth of *Fraxinus*, *Crataegus*, *Spiraea*, *Amelanchier*, *Acer*, *Salix*, etc. It will be noticed that we meet here the same genera which are characteristic of the bottom lands, and, it may be added, the same species as well. Although the soil is wet, as is indicated by the roots of trees which spread over the surface of the ground instead of growing downward, yet we do not find those gymnosperms which are most characteristic of bottom lands. Here, too, we find little of *Gaultheria* and *Berberis* so characteristic of the rolling lands and in the more open spaces find species of *Rosa* and *Symphoricarpos* and dense thickets of *Spiraea Douglasii*.

Some of the densest forest-covering of the upland is second-growth Douglas spruce some forty or fifty years old. As a rule, in such woods there are large trees of a much greater age whose low, wide-reaching branches indicate an isolated condition during most of their earlier years. It is said by the older inhabitants that before much immigration had taken place, considerable areas of land in the lower Willamette valley were covered only by large isolated trees and a luxuriant growth of grass, a condition, as they say, maintained by the Indians. As parts were fenced off by the settlers for cultivation, the rest was neglected and soon sprang up to undergrowth which one sees to-day as a forest of young trees fifty feet or more in height. Whether the report is true or not, the forest conditions in many places now show plainly that a younger forest has arisen there in the last fifty years. A tract of land which was under the writer's own observation in 1884, was then almost entirely devoid of undergrowth, the growth having been cleared off and burned a few years previous. In the summer of 1901, however, this tract was again visited and found covered with an almost impenetrable growth mostly of young *Pseudotsuga*, about twenty feet in height. The Douglas spruce is, however, not the first to appear on neglected areas. As a rule, a growth of *Salix* soon appears, and for some time it is the only thing in sight. Later, this growth is largely replaced by other deciduous shrubs, *Corylus rostrata*, *Holodiscus discolor*, etc., which in turn yield to the spruce. The forest encroaches

very readily on neglected pasture lands and other areas which have previously borne forests. This we may see demonstrated in tracts devastated by forest fires, though such cases are found mostly in mountainous regions. The conditions above described are found mainly in the northern part of the Willamette valley.

The valleys of streams tributary to the Willamette which head in the Coast Mountains are flanked in their upper parts by forests of much the same character as those described above. Along these streams it is noticeable that the vegetation is much the same as that which characterizes the river bottoms already described but along with *Thuja* and *Abies* we find *Tsuga heterophylla*. In the undergrowth the occurrence of *Rubus spectabilis* is occasionally marked. Among the more prominent herbaceous plants *Micranthella Oreana* is often very conspicuous, covering shrubs and small trees to a height of twenty feet or more.

The vegetation of the Coast Mountains is a heavy forest growth, mostly of *Pseudotsuga* with a considerable sprinkling of *Tsuga* and *Thuja*; of the deciduous trees there are species of *Acer*, especially *A. circinatum*, and *Alnus*. In the older burned areas, *Alnus* springs up plentifully along the water courses and every small ravine with springy soil is marked by a line of alders. Comparatively little of the second growth in these "burns" is evergreen; willows and alders are by far the most conspicuous. Most of such burned areas have very little forest growth at all to show in place of the once magnificent growth which covered the mountain tops and the bleached remains of which are still standing or lying upon the ground. In such places the most conspicuous growth is the ubiquitous *Pteridium aquilinum* which often excludes everything else except shrubby plants such as *Rubus Nutkanus* and species of *Vaccinium*.

That section of the state which lies between the summit of the Coast Range and the Pacific Ocean is much more abundantly supplied with moisture than the Willamette valley and parts farther east. The mean annual rainfall in this belt is not far from 80 inches. On the eastern slope of the range it is much less, about 60 inches, diminishing to about 50 inches in the middle of the valley. In some places on the coast the mean precipitation

is even greater. Although, as is the case in the interior, the months of July and August are the driest of the year and about two per cent. of the rainfall of the year occurs in these months, still the western slope of the range is covered by heavy fogs for much of the time during this period. Consequently, vegetation here lacks very little water at any time during the year.

Along the water-courses everywhere in this region the shrubby vegetation appears pretty much the same. *Rubus spectabilis*, the salmon-berry, as it is commonly called in the region where it grows, forms dense thickets with *Acer circinatum* and *Sambucus racemosa*. In the lower lands the alders are larger but usually do not form the dense thickets which are frequently found at higher altitudes. In the more open bottoms *Echinopanax horridum* frequently appears though it seems to prefer the bottoms of deep canyons and more abundant shade. The leaves of this Devil's-cane, as it is commonly called, are from a foot to eighteen inches across and spreading out horizontally make a very showy appearance and form a very characteristic part of the vegetation along deeply shaded streams.

On the lower hills near the coast the forest consists mainly, in some places at least, of *Picea Sitchensis*. It is not found in this latitude many miles from the beach and so far as the writer has observed does not attain the splendid proportions which are reached by the Douglas spruce in its favorite habitat. This tree reaches its best development back a mile or two from the beach but is not conspicuous at high altitudes. It holds the outposts of arboreal vegetation on the sand dunes, which it shares with *Pinus contorta*, but in such places like other trees it is dwarfed and stunted.

In the Coast Mountains the range of arboreal species is not great. The predominant element of the vegetation is the so-called fir, or Douglas spruce, along with lesser quantities of other trees already mentioned; the latter, however, rarely if ever occur in sufficient quantity to lend any special character to the landscape.

While there is a uniformity in distribution throughout the mountainous regions, of those plants mentioned above as occur-

ring in the Coast Range, one is often impressed by the abrupt transition from the vegetation of the flat and open uplands of the lower Willamette valley to that of the mountains. A comparison of the Nehalem and Willamette river valleys is a case in point. The Nehalem flows through a mountainous region and in part of its upper course is separated from the Willamette valley by a low range of mountains some ten miles across. While there is a difference of not more than 500 feet in the altitude of the two valleys at some places, there is a marked difference in soil and vegetation. The Nehalem valley has practically the same vegetation as the mountain region which it drains. As one crosses the divide into the Nehalem region the difference in the vegetation is readily apparent. The oak is left behind but the hemlock becomes conspicuous. Instead of the vegetation peculiar to the stream bottoms of the lower country, the water courses are fringed with the wild currant, salmon-berry and Devil's-cane, for the most part. In a detailed description of the flora, various other differences might be mentioned. The whole region offers an interesting field for the study of the distribution of native species.

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EXTRUSION OF THE GAMETES IN FUCUS

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Dr. E. B. Copeland's note in *TORREYA* for November, 1901, on the extrusion of the gametes of *Fucus* suggests a comment or two.

In the first place, Thuret* in 1854 and Oltmanns† in 1889 said that the escape of the egg-cells and spermatozoids is "hastened" by exposing fertile branches to the air. There may be other appearances of the same statement, but these two are worth instancing. I doubt either of these authors being willing

*Thuret, G. Recherches sur la fécondation des Fucacées. Ann. d. Sci. Nat., IV. 2: 197-214. 1854.

†Oltmanns, F. Beiträge zur Kenntniss der Fucaceen. Bibl. Botanica, 3¹⁴: 1-94. 1889.